

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 June 2002 (13.06.2002)

PCT

(10) International Publication Number
WO 02/046621 A3

(51) International Patent Classification⁷: **F15B 1/02**,
11/028

(21) International Application Number: **PCT/IB01/02784**

(22) International Filing Date:
28 November 2001 (28.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PR 1704 28 November 2000 (28.11.2000) AU

(71) Applicant (for all designated States except US): **IFIELD TECHNOLOGY LTD.** [GB/GB]; Unit K, Tromode Industrial Estate, Douglas, Isle of Man, British Isles IM4 4QD (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **FRAZER, Hugh, Ivo** [AU/AU]; Cliftonville Road, Lower Portland, NSW 2756 (AU).

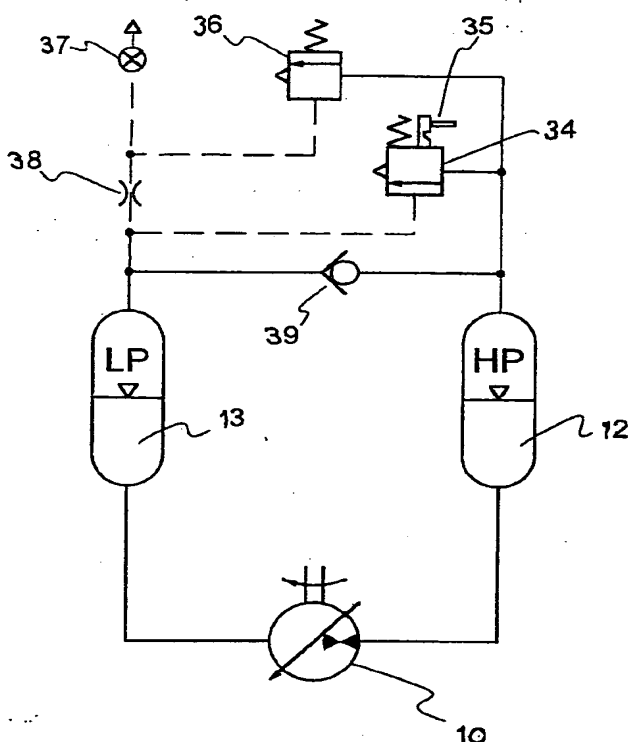
(74) Agent: **NEWSTEAD, Michael, John**; Page Hargrave, Southgate, Whitefriars, Lewins Mead, Bristol BS1 2NT (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GI, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM).

[Continued on next page]

(54) Title: **EMERGENCY ENERGY RELEASE FOR HYDRAULIC ENERGY STORAGE SYSTEMS**



(57) Abstract: A method for the release of energy in storage hydraulic energy propulsion systems having hydro-pneumatic accumulators (12,13) used in vehicles and in hydraulic hybrid vehicles. Pressure-release valves (34,36) and valve systems for the sensing of gas and fluid (liquid) pressures and for detecting malfunctions or pressure variations within an energy storage system are disclosed.

WO 02/046621 A3



European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
10 April 2003

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 01/02784

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 F15B1/02 F15B11/028

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F15B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 623 754 A (DEERE) 9 November 1994 (1994-11-09) abstract; figure -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

25 September 2002

Date of mailing of the international search report

28. 11. 2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax (+31-70) 340-3016

Authorized officer

SLEIGHTHOLME, G

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 01/02784

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claim : 1

Fluid-actuated poppet valve opening when control pressure rises

2. Claim : 2

Fluid-actuated poppet valve opening when control pressure falls

3. Claim : 3

Pressure-release valve with blowout disc

4. Claim : 4

Pressure-release poppet valve with dual pistons

5. Claims: 5-8

Dual-accumulator pressure-release system with two pressure-release valves

6. Claim : 9

Dual-accumulator pressure-release system with solenoid vent valve

7. Claims: 10-12

Dual-accumulator pressure-release system with high-pressure compensated accumulator and low-pressure gas or fluid source, and a method of releasing gas

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 01/02784

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0623754	A	09-11-1994	US 5331882 A	26-07-1994
			BR 9401332 A	18-10-1994
			CA 2119616 A1	06-10-1994
			DE 59403208 D1	31-07-1997
			EP 0623754 A2	09-11-1994
			EP 0756089 A2	29-01-1997
			ES 2103514 T3	16-09-1997
			JP 7004403 A	10-01-1995
